



Flood Risk Assessment

19T2133 – Astley Community High School, Prospect Avenue, Seaton Delaval, Northumberland

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Flood Risk Assessment

Project: Astley Community High School, Prospect Avenue, Seaton Delaval,
Northumberland

Client: Northumberland County Council

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1. Introduction

- 1.1. This Flood Risk Assessment has been prepared in accordance with the requirements of The National Planning Policy Framework (Ministry of Housing, Communities and Local Government - February 2019) [The Framework] and the Planning Practice Guidance to the National Planning Policy Framework Website (Launched 6th March 2014) [The Technical Guidance].
- 1.2. This report has been prepared to supplement the planning application for the new Astley Community High School, Prospect Avenue, Seaton Delaval, Northumberland proposals. See Appendix A for the Site Location Plan.
- 1.3. The proposals are to construct a new school building with an accompanying courtyard, all-weather pitch and grass recreation field on the Greenfield site that had previous agricultural use. There are also proposals to construct associated car parking on the Brownfield site that was used for the now demolished Whytrig Middle School. For reference throughout the document, when discussing each individual parcel of land, they will be referred to as follows:
 - **SCHOOL SITE** – New school building, courtyard, car parking, playing fields, grass recreation field.
 - **CAR PARKING SITE** – Associated new car parking

2. Existing Site & Drainage

2.1. Site Location

- 2.1.1. Site Name: Astley Community High School
- 2.1.2. Site Address: Land off Prospect Avenue, Seaton Delaval, Whitley Bay NE25 0DN
- 2.1.3. OS Grid Reference: E: 430410 , N: 575519
- 2.1.4. National Grid Reference: NZ304755

2.2. Site Description

- 2.2.1. Site Area: **SCHOOL SITE:** 10.330Ha (located on Prospect Avenue), **CAR PARKING SITE:** 2.032Ha (located on Western Avenue)
- 2.2.2. Existing Land Use: **SCHOOL SITE:** Agricultural Field, **CAR PARKING SITE:** Demolished School
- 2.2.3. Proposed Land Use: **SCHOOL SITE:** New School Building, Courtyard, Car Parking, All Weather Pitch and Grass recreation Fields, **CAR PARKING SITE:** Associated New Car Parking
- 2.2.4. Local Planning Authority: Northumberland County Council
- 2.2.5. Sewer Undertaker: Northumbrian Water (NWL)
- 2.2.6. School Site is located approximately 1.64km northwest of Holywell and approximately 3.71km southeast of Cramlington. This contains an agricultural field. The site is bound by The Avenue to the southeast boundary, agricultural fields to the northeast boundary, existing residential buildings to the southwest boundary and a mixture of residential buildings and agricultural fields to the southern boundary. Car Parking Site is bound by Western Avenue to the southeast, Astley Road to the northeast, an existing school to the southwest and residential properties to the northwest.

2.3. Flood Zone (Table 1 NPPF)

- 2.3.1. The development lies entirely within Flood Zone 1 (See Appendix C for Flood Maps).

2.4. NPPF Site Classification (Table 2 NPPF)

- 2.4.1. The vulnerability classification for 'Non-residential uses for health services, nurseries and educational establishments' is "More Vulnerable".

2.5. Flood Zone "Compatibility" (Table 3 NPPF)

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	Yes	Yes	Yes	Yes	Yes
Flood Zone 2	Yes	Exception test required	Yes	Yes	Yes
Flood Zone 3a	Exception test required	No	Exception test required	Yes	Yes
Flood Zone 3b	Exception test required	No	No	No	Yes

- 2.5.1. The proposal to construct the new school building with accompanying recreational area and Car Parking Site is acceptable in terms of flood risk in accordance with Table 3 of the NPPF (above).

2.6. Sequential Testing

- 2.6.1. Sequential testing is not required for this scheme.

3. Definition of the Flood Hazard

3.1. Tidal Flood Risk

- 3.1.1. School Site is approximately 3.41km from the sea and located at an elevation of approximately 35m AOD. Car Parking Site is of similar placement and level. It is therefore considered that the site will not be affected by flooding from the sea.
- 3.1.2. The risk of flooding from the sea is categorised as **LOW**.

3.2. Fluvial Flood Risk

- 3.2.1. The nearest named watercourse is Lysdon Burn. This is located approximately 925m northeast of site and flows predominantly South to North.
- 3.2.2. The nearest unnamed watercourse is located 580m northwest of the site, running southwest to northeast. This is a tributary of Lysdon Burn.

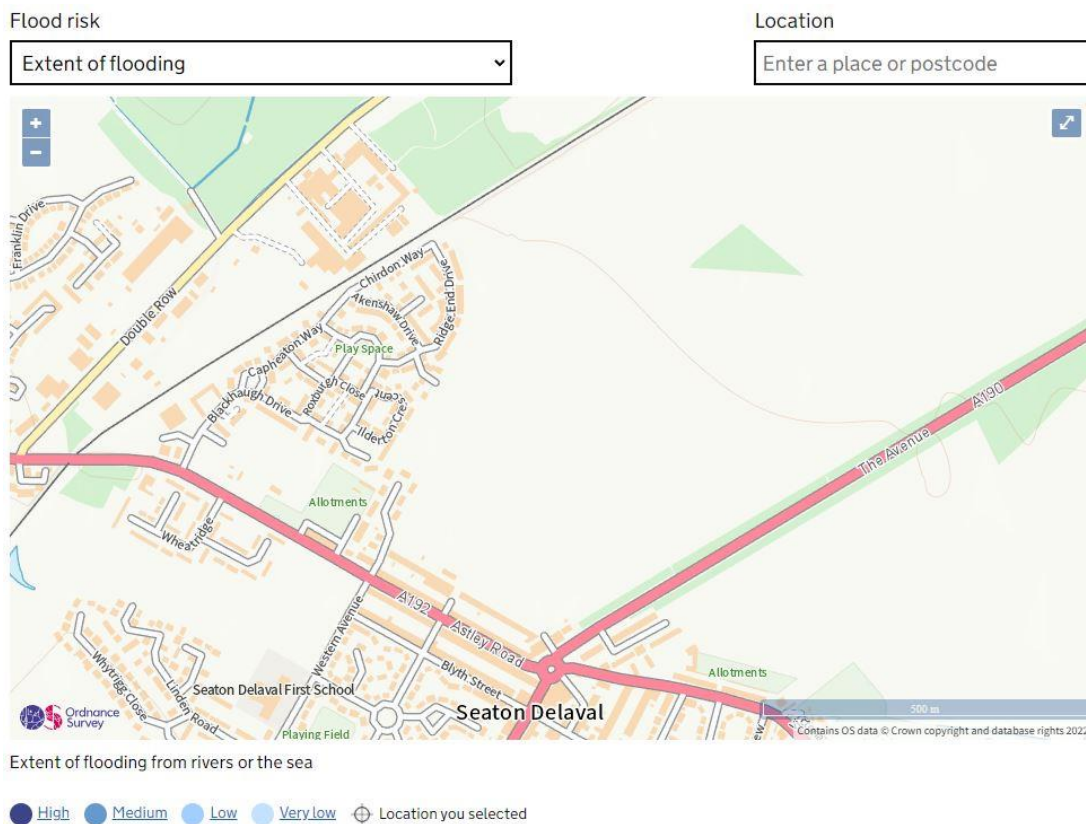


Figure 1 – Environment Agency General Flood Map for Planning – Rivers and Seas

- 3.2.3. The Environment Agency 'Flood Map for Planning' (Figure 1 and Appendix C) shows that the proposed site is entirely within Flood Zone 1. Flood Zone 1 is land that is assessed as having less than a 1 in 1000 (0.1 percent) chance of flooding each year.
- 3.2.4. It is considered that the risk of flooding to the site from fluvial sources is categorised as **LOW**.

3.3. Overland Flood Risk

- 3.3.1. Intensive rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in localised flooding.

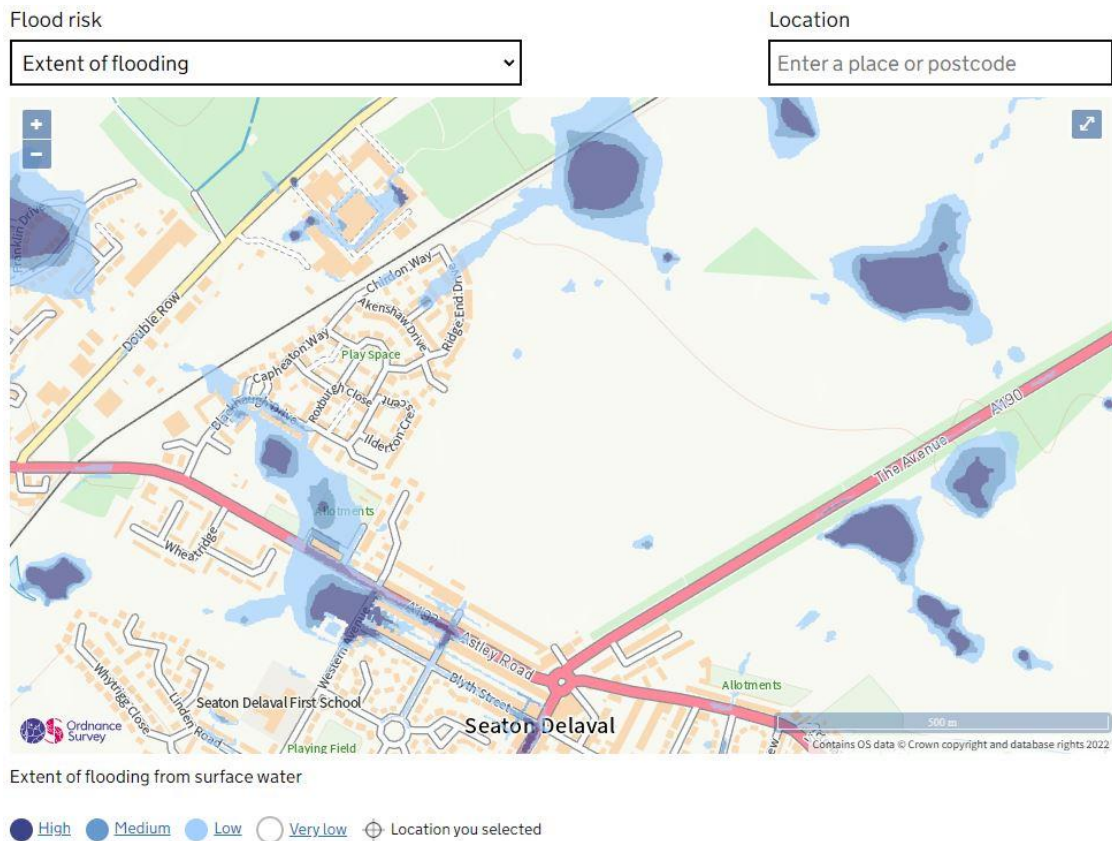


Figure 2 – Environment Agency Detailed Surface Water Flooding Map for Planning (Extents of Flooding from Surface Water)

- 3.3.2. Figure 2 shows the extents of flooding during various surface water flooding events. The areas with the darkest blue colour are representative of the “high” risk scenario, which are the surface areas predicted to flood in the more frequent storms (<1 in 30 year). The areas with the lightest blue colour are representative of the “low” risk scenario, which are the surface areas predicted to flood in the less frequent storms (>1 in 100 year). As expected, the less frequent and more intense storms would effect a larger surface area.
- 3.3.3. The School Site levels fall from the southwest boundary in a northeast direction, from an approximate level of 35m AOD to 32m AOD at an approximate gradient of 1:125. The site levels also appear to raise from the northwest boundary at 34m AOD to a high point of 36m AOD at an approximate gradient of 1:75. The levels then fall to 35m AOD at the southeast boundary, at an approximate gradient of 1:125.
- 3.3.4. The Car Parking Site levels appear flat, at an approximate level of 36m AOD sitewide.
- 3.3.5. As can be seen in Figure 2, School Site may be affected slightly by overland flows but the risk is predominantly “low”, which is less frequent than a 1 in 100 year storm. Within the low risk area, there is a small area which is “medium” risk, which would be expected

in a storm event between 1 in 30 year and 1 in 100 year. During development, the levels will be regraded in this area so would anticipate that the flood risk would be mitigated to **LOW** through positive drainage systems and reprofiling of the land.

- 3.3.6. Car Parking Site is affected by surface water at a "high" risk, which is more frequent than a 1 in 30 year storm. As this development is only a car park, the proposals will be designed to reflect the existing ground levels to avoid disturbing the current surface water flooding extents. The car park will be positively drained and designed to 1 in 100 year storm + climate change, which is anticipated to alleviate in part the flooding.
- 3.3.7. Based on the above information, the existing risk of flooding from overland sources is categorised as **LOW** for School Site, however will be classified as **HIGH** for Car Parking Site.

3.4. Groundwater Flood Risk

- 3.4.1. Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low lying areas underlain by permeable rocks.
- 3.4.2. A 'Phase 1 Desk Study' has been carried out by Solmek dated November 2019. (Report No. S200135).
- 3.4.3. The report notes the geology beneath the site is classified as a secondary aquifer – A with overlying drift classified as secondary aquifer – undifferentiated. The site does not lie within a source protection zone.
- 3.4.4. The site is shown to be underlain by Pennine Middle Coal Measures Formation, consisting most likely of cyclic beds of mudstone, siltstone and sandstone with coal seams of varying thickness. Any drift deposits on site are likely to be silty, sandy and gravelly Glacial Till with occasionally sandy and gravelly lenses.

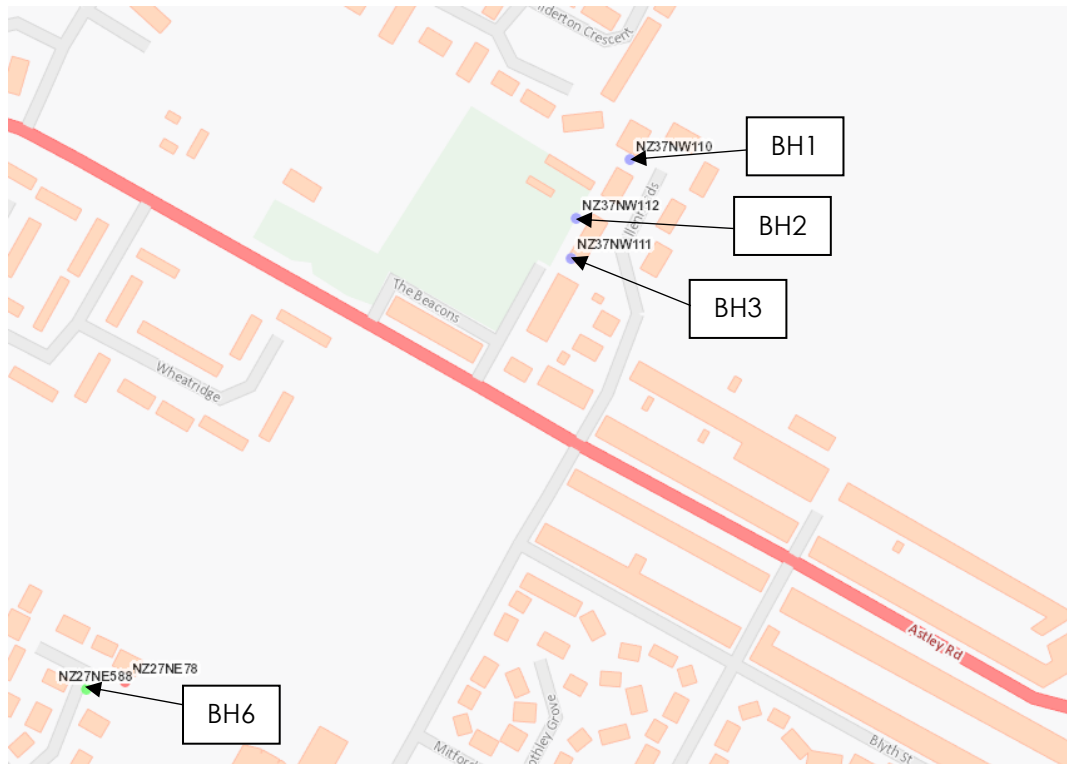


Figure 3 – BGS Borehole Records Borehole Locations

- 3.4.5. The BGS borehole records (Appendix F) have also been checked to determine the risk of groundwater flooding for School Site (BH1-3):
 - Thin concrete on soily ash fill to depths of 0.4mBGL to 0.9mBGL (BH1-3).

- Disturbed sandy clay to depths of 0.8mBGL (BH1) and 0.9mBGL (BH3).
 - Light brown and grey stony clay to depths of 1.2mBGL (BH2).
 - Wet black ash at a depth of 1.20mBGL (BH3).
 - Firm brown and grey mottled clay to depths of 3.0mBGL (BH1-3).
- 3.4.6. The BGS borehole records (Appendix F) have also been checked to determine the risk of groundwater flooding for Car Parking Site (BH6):
- Top soil to depths of 0.5mBGL
 - Brown grey mottled clay to depths of 1.6mBGL
 - Firm dark brown grey marbled clay to depths of 4.0mBGL
 - Fairly dense wet fine to medium grained grey sand to depths of 7.6mBGL.
 - Grey laminated clay to depths of 8.2mBGL.
 - Dry dense grey sand to depths of 11.8mBGL.
 - Stiff dark grey boulder clay to depths of 20.0mBGL.
- 3.4.7. As the main build-up of the ground near both parcels of land is clay, which is impermeable, groundwater will not be able to permeate through these layers and flood the site. The wet black ash in BH3 was identified to be perched water due to the other boreholes being dry and the disturbed sandy clay situated above the clay.
- 3.4.8. The information above suggests the risk of flooding to the proposed site from ground water is therefore categorised as **LOW**. However, a Phase 2 Site Investigation should be carried out in order to determine infiltration rates and ground makeup, through boreholes and trial pits. This will confirm the **LOW** risk to flooding from groundwater.

3.5. Flooding From Sewers

- 3.5.1. A 375mm – 525mm adopted Combined Water sewer passes through School Site, flowing parallel the southeast boundary of the site. The probability of this flooding and posing a flood risk to the development site is low. Any combined water flooding will be localised within the field however would be expected to follow the topography of the site in general. In the completed state, it is likely that this sewer will be diverted South as the proposed school building will be situated above the existing combined water sewer.
- 3.5.2. A number of 150mm Foul Water sewers are located adjacent to the northwest boundary of School Site, within the existing residential infrastructure. These sewers currently serve the surrounding residential properties. The probability of these sewers flooding and posing a risk to the site is low. Any flooding from these sewers will be contained within the kerb lines of the existing road infrastructure.
- 3.5.3. School Site may have had historic agricultural purposes, and as such, existing land drainage may be present. In the event of any land drainage being discovered during excavations on site, it is recommended that the drain is repaired or diverted. Should this not be possible due to layout constraints, then it is recommended that the land drain is further investigated by the development engineer, to determine if the drain is still required post development. However, significant flood risk is not expected from this source and therefore can be considered as low.
- 3.5.4. A 300mm – 450mm Combined Water sewer is located northwest of Car Parking Site, flowing northeast. This then flows underneath Astley Road on the northeast boundary of the associated car parking, eventually connecting to the combined water sewer mentioned in 3.5.1. Any flooding of this sewer will be contained within the kerb lines of Astley Road.
- 3.5.5. Based on the above the risk of flooding from sewers is categorised as **LOW**.

3.6. Flooding from Artificial Sources

- 3.6.1. Based on the Environment Agency map 'Flood Risk from Reservoirs' both parcels of land are not at risk from any artificial sources such as reservoirs.
- 3.6.2. The risk of flooding from artificial sources is categorised as **LOW**.

4. Probability of Flooding

- 4.1. The Environment Agency maps have been reviewed (see Appendix C). The entirety of the development site is identified as being in Flood Zone 1 as categorised by the National Planning Policy Framework (NPPF) and Technical Guidance.
- 4.2. Flood Zone 1 describes the land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year.
- 4.3. The previous section describes other flood hazards and the risk they pose to this project. A summary of the existing flood risk and the mitigation required is provided within Table 1 below.
- 4.4. The previous section describes other flood hazards and the risk they pose to this project. All sources of Flood Risk for School Site are categorised as **LOW**. All sources of flood risk for Car Parking Site are categorised as **LOW**, apart from surface water which is classified as **HIGH** risk.
- 4.5. Based on the previous section the overall assessment of the probability of flooding to the existing site is **LOW**.

Table 1 – Summary of existing flood risk and mitigation strategies

Flood Risk Source	Current Risk Level	Mitigation Requirement during detailed design	Risk Level following Mitigation
Tidal or Fluvial Flooding	LOW	Development is located in an area of low risk – not required.	LOW
Surface Water	<p>LOW in School Site</p> <p>HIGH in Car Parking Site</p>	<p>School Site</p> <p>According to the environment agency flood maps, the site is at low risk of surface water flooding.</p> <p>The risk to the proposed development can be mitigated by:</p> <ul style="list-style-type: none"> A positive sewage network that will direct flows from low lying areas into positive drainage infrastructure. This is expected to alleviate any historic low-lying areas of ponding. <p>Car Parking Site</p> <p>According to the environment agency flood maps, the site is at high risk of surface water flooding.</p> <p>The risk to the proposed development will remain high, however the development will not create additional flooding by:</p> <ul style="list-style-type: none"> A positive sewage network that will direct flows from low lying areas into positive drainage infrastructure. This is expected to alleviate any historic low-lying areas of ponding. Building car parking levels to suit the existing levels on site. 	<p>LOW in School Site</p> <p>HIGH in Car Parking Site</p>
Groundwater	LOW	Groundwater has not been encountered in the BGS borehole records adjacent to the site. The records show clay to depths of 3.0mBGL – 4.0mBGL, which is impermeable and will not allow groundwater to flood the site.	LOW
Sewer Flooding	LOW	<p>Any flooding from NWL sewers in adjacent developments due to blockages or following intense rainfall periods would be retained within the kerb lines and drained via the existing road gullies as the flood waters retreat.</p> <p>Design proposed levels to direct surface water around buildings or structures that could form a barrier and away from building entrances.</p> <p>Ensure proposed drainage is designed in accordance with best practices with an allowance for climate change.</p>	LOW
Artificial Sources	LOW	The site is not at risk from any artificial sources according to the EA map 'Flood Risk from Reservoirs'.	LOW

5. Climate Change

- 5.1. NPPF Planning Practice Guidance website provides information on the impacts of climate change, which include sea level changes, river flash flooding and more frequent high intensity, short-duration rainfall. These are based on the Environment Agency current recommendations.
- 5.2. As concluded previously the risk of flooding from all sources is low, apart from overland flows in Car Parking Site which are at high risk. There is a possibility that the overland flows for Car Parking Site may be affected by climate change.

6. Detailed Development Proposals

- 6.1. The proposals are to construct a new school building with an accompanying courtyard, all-weather pitch and grass recreation field on the Greenfield site that currently houses the existing Astley Community High School. There are also proposals to construct car parking on the brownfield site that was used for the now demolished Whytrig Middle School. Appendix A shows the Site Location Plan.
- 6.2. The proposed site layout within Appendix B shows the extents of highways and building positions. The majority of the highway will be offered for formal adoption. For School Site, the new school and on-site parking will be accessed off Astley Road. For Car Parking Site, the car parking will be accessed off Western Avenue.
- 6.3. Minor highway works are proposed to the existing road off Astley Road to the southwest of the site to provide the access to site. These works will be carried out in accordance with Northumberland County Council Highways guidance.
- 6.4. The current use means that the surface water drainage discharge rate will need to be kept as close as practicable to Greenfield rates as per the Northumberland County Council SuDS Adoption Guidance for Major Developments. The surface water is to follow the discharge hierarchy in Building Regulations H3:

"Rainwater from a system provided ... shall discharge to one of the following, listed in order of priority:

 - a) An adequate soakaway or some other adequate infiltration system; or, where this is not reasonably practicable,
 - b) A watercourse; or, where that is not reasonably practicable,
 - c) A surface water sewer.
 - d) A combined sewer."
- 6.5. The initial findings from BGS records indicate it may be difficult to discharge to soakaways due to the impermeable underlying clay that is anticipated throughout the site. It may also be difficult to discharge to a watercourse, due to the distance to the nearest watercourse and the surrounding infrastructure. The NWL records show that there are no NWL surface water sewers that can be connected into within a close proximity to the site.
- 6.6. Therefore it is likely the surface water for School Site will discharge to a combined water sewer, most likely the 375mm – 525mm combined water sewer mentioned in 3.5.1. The surface water from Car Parking Site will also likely discharge into a combined water sewer, most likely the 300mm – 450mm combined water sewer mentioned in 3.5.4.
- 6.7. Foul water will most likely discharge to the 375mm – 525mm combined water sewer for School Site. There will be no foul flows from Car Parking Site.
- 6.8. A comprehensive Drainage Philosophy is required to review Building Regulations Part H hierarchy for discharge of surface water and to identify feasible outfall locations.

7. Flood Risk Management Measures

- 7.1. As stated in previous sections, the site is at low risk of flooding from tidal, fluvial, sewer, overland, groundwater and artificial sources post development. All impermeable areas will be positively drained via a positive drainage systems. Flood risk from surface water remains high within Car Parking Site.

8. Off Site Impacts

- 8.1. The proposals for this site should not increase the flood risk elsewhere off site for the following reasons:
- The proposed surface water discharge rate will be restricted as close as reasonably practicable to Greenfield runoff rates and agreed with the Lead Local Flood Authority.
 - The impermeable areas within the site will be positively drained via a proposed drainage network and designed to the 1 in 100 year storm + climate change, with attenuation provided accordingly.

9. Residual Risks

- 9.1. Recommendations have been made within Section 7 to mitigate against any flood sources that pose any significant risk to the proposed site. All sources of flooding have been considered and the conclusion is that any residual risks are negligible. Flood risk from surface water within Car Parking Site is to remain status quo post development.

10. Conclusions

- 10.1. From the analysis it can be seen that the risk of flooding to School Site is **LOW** from all forms of flooding as categorised in the Framework and Technical Guidance. The risk of flooding to Car Parking Site from all forms of flooding is **LOW**, apart from surface water which is **HIGH**. This will be classified as **HIGH** post development and remain status quo. The flood designation for the site is **LOW**.
- 10.2. The proposed uses of land are appropriate in this Flood Zone. (Tables 1, 2 & 3 of the Technical Guidance).
- 10.3. This report has been prepared with reference to the information available at the time of writing. The summary and recommendations may be revised upon receipt of additional or further information.

Report No: 19T2133 / FRA001

Report Title: Flood Risk Assessment – New Astley Community High School, Prospect Avenue, Seaton Delaval, Northumberland



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Date: 20/01/2022



Jim Conway – Director (BSc CEng MICE)
Date: 20/01/2022

For and on behalf of Billinghurst George & Partners



Appendix A
Site Location Plan



Appendix B
Proposed Site Layout



Appendix C

Environment Agency Flood Maps



Appendix D

Northumbrian Water Drainage Records



Appendix E Topographic Survey



Appendix F

BGS Borehole Logs

Appendix G

Reference Documents List

The National Planning Policy Framework (March 2012)	Communities and Local Government
The Technical Guidance to the NPPF (March 2012)	Communities and Local Government
Flood Risk Assessment Guidance Note 1	Environment Agency